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|--|------------------------------|---|
| 1. REPORT NUMBER ARO 22244.2-CH | 2. GOVT ACCESSION NO. N/A | 3. RECIPIENT'S CATALOG NUMBER N/A |
| 4. TITLE (and Subtitle) Elastic and Inelastic Scattering of Colloidal Particles | | 5. TYPE OF REPORT & PERIOD COVERED Final (4/15/85-8/31/88) |
| 6. PERFORMING ORG. REPORT NUMBER | | 7. CONTRACT OR GRANT NUMBER(s) DAAG29-85-K-0102 |
| 8. PERFORMING ORGANIZATION NAME AND ADDRESS Clarkson University Potsdam, New York 13676 | | 9. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS |
| 10. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Research Office Post Office Box 12211 Research Triangle Park NC 27709 | | 11. REPORT DATE October 1988 |
| 12. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) | | 13. NUMBER OF PAGES |
| | | 14. SECURITY CLASS. (of this report) Unclassified |
| | | 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE |
| 16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited. | | |
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| 18. SUPPLEMENTARY NOTES The view, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentation. | | |
| 19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Light scattering, Raman scattering, Surface enhanced Raman scattering, Colloidal silver . <i>DET C</i> | | |
| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number) See reverse | | |

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20. Abstract

This project has continued the experimental and theoretical investigation of surface enhanced Raman scattering of molecules adsorbed on silver colloids. It includes the combined enhancement of normal and resonance Raman scattering as well as the observation of each of these effect separately on the same substrate. In addition there were studies of chromate, molybdate and tungstate on colloidal silver. Theoretical studies included the effect on enhancement of adsorption within cavities rather than on convex roughenings, the enhancement of light emission from tunnel junctions and the comparison of SERS calculations with calculation of surface-averaged electromagnetic intensities. In addition, the effect of variation of values of the optical constants on the values of SERS was studied.

Handwritten: 20. Abstract

List of Publications

1. O. Siiman, R. Smith, C. Blatchford and M. Kerker, Combined surface-enhanced and surface-resonance Raman spectra of dabsyl aspartate adsorbed on a silver electrode, *Langmuir* 1, 90-96 (1985).
2. H. Chew and M. Kerker, Surface-enhanced Raman scattering from metal films containing dielectric cavities, *J. of Opt. Soc. of Am.* B2, 1025-1027 (1985).
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4. M. Kerker, The optics of colloidal silver: Something old and something new, *J. of Coll. and Interf. Sci.* 105, 297-314 (1985).
5. H. Chew, M. Kerker and D.-S. Wang, Light emission from cylindrically structured tunnel junctions, *J. Opt. Soc. of Am.* B3, 199-204 (1986).
6. A. Lepp and O. Siiman, Surface Raman investigation of the sorption of dabsyl aspartate and polyvinylpyrrolidone on colloidal silver in ethanol, *J. of Coll. and Interf. Sci.* 105, 325-341 (1985).
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13. M. Kerker, Enhanced Raman scattering in colloidal systems, in "Laser scattering spectroscopy of biological objects", Proceedings of the International Conference held in Prague, Czechoslovakia, Eds.: J. Stepanek, P. Anzenbacher and B. Sedlacek, Elsevier, 1987, 3-14.
14. O. Siiman and H. Feilchenfeld, Internal fractal structure of aggregates of silver particles and its consequences on surface-enhanced Raman scattering intensities, *J. Phys. Chem.* 92, 453 (1988).

15. D. Curley and O. Siiman, Conformation and orientation of the haptens, 2,4-dinitrophenyl amino acids, on colloidal silver from surface-enhanced Raman scattering, *Langmuir* 4, 1021-1032 (1988).
16. R. Bhandari and M. Kerker, Monte Carlo analysis of the internal structure of light scattering particles with slit scan illumination, *J. of Statistical Physics*, 52, 1263 (1988).

Scientific Personnel Supported by this Project and Degrees Awarded

Milton Kerker, Principal Investigator
 Olavi Siiman, Co-Principal Investigator
 Ramesh Bhandari, Research Associate Professor
 Hannah Feilchenfeld, Visiting Professor
 Dau-Sing Wang, Consultant

Adam Lepp, M.S. thesis "A system for studying surface resonance Raman phenomena" (1985)

Diane Curley, M.S. thesis, "Conformation and orientation of 2,4-dinitrophenyl amino acids (DNP-haptens) on colloidal silver" (1987)



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